ಬೃಹತ್ ಬೆಂಗಳೂರು ಮಹಾನಗರ ಪಾಲಿಕೆ
Bruhat Bengaluru Mahanagara Palike

DETAILED PROJECT REPORT

CONSULTING SERVICES FOR PREPARATION OF DETAILED PROJECT REPORT FOR

Name of Work: Providing Walking track and other developmental works to Attur lake in Ward No.03 Attur

- COST OF THE PROJECT: 200.00 LAKHS

Submitted To:
The Executive Engineer,
Yelahanka Project Division,
B.B.M.P, Bangalore.

SILICON
CONSULTING ENGINEERS

#S1317, 4th CROSS
BEL 2nd STAGE, BHARATH NAGAR
BANGALORE – 560 091
CELL : 9448353883

CONTENTS

Chapter No.	Description	Page No.
1	Introduction	3-8
2	Investigation & Surveys	9-12
3	Design Standard & Specification	13-17
4	Project Cost Estimates	18

Annexure

Annexure A. 1.1 Key Map

Annexure A. 4.1 Detailed Cost Estimate, Rate Analysis

Chapter -1
INTRODUCTION

Chapter -1

INTRODUCTION

1.1.1 General

Bengaluru is the capital of India's southern Karnataka state. The center of India's high-tech industry, the city is also known for its parks. It is also known as the Garden City because of its many beautiful gardens and parks. By Cubbon Park, Vidhana Soudha is a Neo-Dravidian legislative building. Former royal residences include 19th-century Bangalore Palace, modeled after England's Windsor Castle, and Tipu Sultan's Summer Palace, an 18th-century teak structure.During the last couple of decades, city has witnessed drastic increase in population, change in land use pattern of the city, life style of the people and their commuting habits and the revolutionary changes that has taken place in the automobile industry. This has contributed to the growth of vehicular traffic in an enormous way.

1.1.2 City Background

It also called the Silicon Valley of India , because of the high concentration of IT industry. Bangalore is rated to one of the fastest growing cities in Asia with a current population of more than 10 million. During the last couple of decades, city has witnessed drastic increase in population, change in land use pattern of the city, life style of the people and their commuting habits and the revolutionary changes that has taken place in the automobile industry.

1.1.3 Population

The Bangalore city population is currently more than 11 million and increasing in a forward march. The lifestyle of the citizens is changing day to day due to globalization and introducing of new brands in all sector. Bangalore, the fastest growing city of India, comprises of a dynamic blend of people, belonging to various religions, castes and communities. With the introduction of information technology in the city, it has assumed an international character. IT professionals not only from the various parts of India, but also that of the world, are migrating to the city. This has led to Bangalore becoming more like the melting pot of various cultures. Read on to know more about the people and lifestyle of Bengalooru, India.

1.1.4 Traffic growth

What adds to the traffic pressure in Bengaluru in particular is that there is very little scope for expansion of roads and the need to use existing roads for smooth movement of vehicles is

even more pronounced. It thus becomes mandatory for the administration to ensure better parking facilities. So far, the government and the BBMP have not taken this issue seriously and now the situation is such that it needs to be addressed seriously and effectively. Rapid population growth because of IT and other associated industries in Bengaluru led to an increase in the vehicular population to about 1.5 million, with an annual growth rate of 7-10%. With the increase in population and the expansion of the city, the problem of connectivity of the populace has arisen. Quite obviously personalized modes of transport have grown at a tremendous rate and two wheelers along with the cars almost comprise 90% of the total registered vehicular population in the city. Two wheelers constitute more than 70% of the total volume, while cars comprise 15%, autos 4% and the remaining 8% includes other vehicles such as buses, vans and tempos.

Project Location

The Project includes Providing Walking track and other developmental works to Attur lake in Ward No.03 Attur. The Project area is in Yelahanka Assembly constituency, Bangalore. The Project stretch includes main roads and cross roads of Ward 03 Attur. By considering these reasons the roads are taken up for Development with Asphalting depending upon the site scenario.

Key Map of the roads proposed is enclosed in **Annexure A.1.1.**

M/s. SILICON CONSULTING ENGINEERS is entrusted by BBMP to carry out the work of Preparation of Detailed Estimate and Report for the above said work.

Accordingly we **M/s. SILICON CONSULTING ENGINEERS** have commenced the consultancy works as per the scope of services described in the RFP document.

1.2 Scope of Work

The Scope of Services of the Consultancy includes the following:

Inventory and condition surveys for alignment.

- Engineering surveys and investigations
- Improvement to the existing pavement and drains, such as horizontal and vertical alignment, curve straightening, rising of the road level in low lying areas above the HFLs, concentric widening / eccentric widening etc.
- Design of Pavement.
- Design of lateral side drains and Cross drainage works such as culverts etc
- Rate analysis of scheduled items, BOQ and Cost estimates.

- ❖ Final Detailed Project Report and final drawings
- ❖ Photos of the project roads

1.2.1 Engineering surveys and investigations

The engineering surveys and investigations shall be divided into the following components:

- Topographic, alignment and land use survey
- Inventory survey
- Bridge condition survey
- Soil, geo-technical, material, hydrology and drainage surveys

1.2.1.1 Topographic, alignment and land use survey

The activities and Deliverables forming part of the topographic, alignment and land use survey are described below:

(a) Divide the Project Highway into various stretches as per terrain classification.

(b) Identify sections of Project Highway which require raising. Such sections will be identified with attention being paid to the previous history of submergence and the extent to which the sub grade is likely to be affected by the capillary action if the section is not raised.

(c) As far as possible, the existing alignment would be retained subject to the following requirements:

(d) Identify stretches where the gradients are steeper than the ruling gradient for the relevant terrain condition. Work out and prepare an improvement plan for the vertical alignment in such stretches.

(e) Identify stretches involving construction of new bridges and other structures including those requiring reconstruction and their approaches. Work out proposal for location of such structures and alignment of approaches.

(f) Based on the improvement plans of horizontal and vertical alignment worked out as a result of tasks in prepare alignment plans, cross-sections of the entire Project Highway.

(g) A set of cross-sections of the existing road at equal intervals for each section shall be provided by the Consultant. These cross-sections along with proposed improvement plan and preliminary design shall form the basis of preparation of indicative BOQ for the Project Highway.

1.2.1.2 Road inventory survey

(a) An inventory of road, culverts, bridges and other structures like railway over/under bridges, flyovers (grade separated structures), underpasses and overpasses.

(b) Identification of stretches of the Project Highway which -

(i) are affected by frequent flooding;

(ii) are subjected to water logging;

(iii) pass through black cotton soil area;

(iv) pass through marshy area; or

(v) pass through weak soil stratum

(c) Identification of sections in cutting.

(d) Identification of culverts requiring:

(i) Reconstruction (all culverts which are structurally distressed shall be reconstructed as new structures).

(ii) Widening (all existing culverts which are not to be reconstructed shall be widened equal to the roadway width).

(iii) Repairs and/or rehabilitation along with preliminary proposals.

(iv) New construction

1.2.1.3 Road condition survey

The Consultant shall undertake a survey of the visual condition of the pavement and shoulders of the Project Highway. The Consultant should also report if distresses are observed in the pavement and shoulders. It will also identify sections requiring reconstruction.

1.2.1.4 Structure condition survey

(a) The Consultant shall carry out a detailed inspection of every structure

(b) For each structure, the Consultant shall indicate the distresses observed, if any, in respect of various components of the structures. On the basis of the distresses observed, the Consultant shall divide the structures into the following categories:

(i) structures requiring reconstruction immediately as part of first stage development (all such structures shall be provided as new structures);

(ii) structures where distresses are not so severe and reconstruction can be postponed to a subsequent stage say for a period of 7 to 8 years; if any major repairs are required in the meantime, these shall be so indicated for each such location;

(iii) Structures requiring repairs and/or rehabilitation (for such structures indicate preliminary proposals for repairs and/or rehabilitation);

(iv) Structures requiring widening (for such structures indicate widening methodology); and

(v) Structures that shall be retained.

1.2.1.5 Soil, geotechnical, hydrology and drainage surveys

(a) The characteristics of the existing soil of the Project Highway.

(b) The determination of sub grade CBR (soaked) of the Project.

(c) Benkleman Beam Deflection measurements on the Project Highway.

(d) Preliminary hydraulic data for structures, design discharge, HFL, LWL, etc. with a view to checking adequacy of existing waterway.

(f) A broad assessment of the drainage condition and requirement of the Project Highway.

1.2.1.6 Road signs, safety devices

(a) The Consultant shall propose provision of Road Signs, Pavement Markings, Safety Barriers, Railings, Delineators.

(b) The Consultant shall propose overhead signs on the Project Highway and provide an outline of the same giving size and location.

1.3 Project cost

The Consultant shall work out indicative BOQ of various components and prepare cost estimates of the Project Highway with a break up of cost for each component separately.

1.4 Organisation of Detailed Project Report

The Methodology, as detailed in the Project proposal, it has been followed for carrying out the necessary Investigations and for the Preparation of Detailed Estimate and Report.

This Report includes the following.

- Chapter 2: Investigation & Surveys
- Chapter 3: Design Standard & Specification
- Chapter 4: Project Cost Estimates

Chapter -2
INVESTIGATION & SURVEYS

Chapter -2
ENGINEERING SURVEYS AND INVESTIGATIONS

2.1 General

Various surveys and investigations that are the essential inputs for detailed engineering design are detailed in this chapter. All the relevant maps / data / details available with the concerned departments have been collected, compiled and reviewed. Particular attention has been given to past / historical data / reports. A review of the past data available in the various studies has been listed out and such available data has been made use of, after updating / augmenting the data wherever necessary. The data as collected has been made use of in analysis, design, formulation of improvement proposals and costing. The activities have been performed on several fronts fully complying with the requirements. The activities that are carried out are brought out hereunder.

The various engineering surveys / investigations of the road sections include:

- Reconnaissance Survey.
- Visual Topographical Survey.
- Road Inventory Survey.
- Pavement Condition Survey.
- Visual Condition Survey.
- Bridge condition survey
- Soil, geo-technical, material, hydrology and drainage surveys

2.2 Reconnaissance Survey

Reconnaissance Survey of the road, considered for improvements, has been carried out to identify the general condition of roads, drains, culverts and bridges for further surveys / investigations, to understand kind of establishments along the stretches of roads and to work out land acquisition scheme. Making use of the observations / data collected during reconnaissance survey, detailed schedule for surveys / investigations required for the project has been finalized.

2.3 Visual Topographical Survey

Topographic Survey has been conducted all along the corridor by physically measuring the Road Width, Footpath Width, Drain Width, Alignment of Road and with the aid of Google Maps.

2.4 Road Inventory Survey

A detailed inventory and condition survey of road sections has been carried out by making use of well structured inventory data format. It was compiled in tabular form, developed using Excel computer software. Various data collected during the road inventory broadly include.

- Type of terrain.
- Land use.
- Carriageway width.
- Type of surfacing.
- Shoulder, Median, Drain (tertiary / shoulder), Footpath - type and width.
- Road Geometry.
- Road Furniture.
- Illumination.
- Salient Buildings & Structures.
- Road Intersection(s) and their details.
- Land width (RoW).
- Culverts, bridges and other structures (type, size, span arrangement and location).
- General drainage conditions.

2.5 Pavement Condition Survey

The Pavement Condition Survey has been carried out in accordance with IRC Guidelines. All surveys and investigations have been carried out with the following objectives:

- To have an up to date record of road assets.
- To have a clear understanding of road side features including land use, drainage characteristics, etc. and
- To assess the condition and strength data for developing improvement proposals and related designs.

2.5.1 Visual Condition Survey

Visual Condition Survey of the road sections has been carried out by travelling along the patching, rutting, pot holes, edge breaking, etc. by visual observations in a well structured data format. The data so collected has been compiled and presented (kilometer wise) in the form of tables for easy understanding. This data has been used to assess the pavement condition.

2.5.2 Soil, geotechnical, material, hydrology and drainage surveys

(i) The activities and Deliverables forming part of the soil, geotechnical, material, hydrology and drainage surveys are described below:

(a) The characteristics of the existing soil of the Project road.

(b) The determination of sub grade CBR (soaked) Project road.

(c) Benkelman Beam Deflection measurements on the Project road for overlay stretches.

(d) Preliminary hydraulic data for bridges, design discharge, HFL, LWL, etc. with a view to checking adequacy of existing waterway.

(e) A broad assessment of the drainage condition and requirement of the Project Highway.

(ii) Road signs, safety devices

(a) The provision of Road Signs, Pavement Markings, Safety Barriers, Railings, Delineators, Chevron Markings, Traffic Attenuators. It shall also include Crash Barriers for existing bridges.

(b) Overhead signs on the Project road and provide an outline of the same giving size and location.

Chapter -3
DESIGN STANDARD & SPECIFICATION

Chapter -3
DESIGN STANDARD & SPECIFICATION

3.1 General

Planning and design of roads & CD structures, pedestrian facilities and street furniture are essentially based on the IRC standards and MoRT&H specifications. Whenever, the codes / standards are silent on some of the aspects, the same has been planned / designed based on sound engineering practices. Design standards relevant to the project road along with the broad list of design parameters and the relevant IRC codes / specifications have been detailed in **Table 3.1.**

Table 3.1: Design Standards

SL No.	Design Parameters	Reference Code
1.	Geometric Design Standards • Carriageway width • Shoulder • Footpath • Median • Camber • Super Elevation • Horizontal Alignment • Vertical Alignment	As per IRC: 38 - 1988, IRC: 86 - 1983 & IRC: SP : 23 – 1993
2.	Road Furniture • Road Delineators • Road Markings • Road Signs	 As per IRC: 79 – 1981 As per IRC: 35 – 1997 As per IRC: 67 – 2001
3.	Road Capacity	As per IRC: 106 – 1990
4.	Pavement Design	As per IRC: 37 – 2012 & IRC: SP 62 - 2014
5.	Overlay Design	As per IRC: 81 – 1997
6.	Road Drainage	As per IRC: SP: 42 - 1994 & IRC: SP: 50 - 1999
7.	Culverts	As per relevant IRC codes and MoRT&H

The project road section passes through plain terrain. Design standards (as appropriate) have been further elaborated under the following heads:

- ❖ Geometric Design
- ❖ Pavement Design
- ❖ Drainage
- ❖ Road Furniture and Appurtenances
- ❖ Bridges and CD Structures

3.2 Design Standards Related to Geometric Design

Design standards related to road geometric along with the suggested design values / standards and recommended values based on site conditions and data analysis are detailed in Table 3.2.

Table 3.2: Geometric Design Standards

SL No.	Design Parameters	Design Values
1.	Design Speed	Design speed Considered is 40 kmph.
2.	Geometric Design Standards	
	• Carriageway Width	Two lane carriageway
	• Camber (Bi-directional)	2.5% for paved carriageway.
	• Super Elevation	Limited to 4%.
	• Footpath	Minimum width - 1.5m
	• Kerb	Barrier / Semi — barrier / Mountable (Barrier type recommended)
	• Extra Widening at Curves	Nil for Radius above 300 m
	• Gradient	Maximum Gradient - 4.0 % (1 in 25) Minimum Gradient for Drainage - 0.5 % (desirable minimum) & 0.3 % (absolute minimum).

3.3 Design Standards Related to Pavement Design

Design standards related to Pavement design are essentially based on the guidelines given in IRC: 37 - 2012 "Tentative Guidelines for the Design of Flexible Pavements " and IRC SP 62-2004 "Guidelines for the Design and Construction of Cement Concrete Pavements for Rural Roads". The suggested design values / standards and recommended values based on site conditions and data analysis are detailed in Table 3.3 and are adapted in the design.

Table 3.3: Design Standards

SL No.	Design Parameters	Reference Code / Design Values
1.	Pavement design	IRC: 37 - 2012 " Tentative Guidelines for the Design of Flexible Pavements "
	Initial Traffic	In terms of CVPD, vehicles weighing more than 3 ton
	Traffic growth rate	5%
	Design Life	10 to 15 years
	Vehicle damage factor	1.5 to 4.5
2.	Soil Characteristics	CBR Value

3.4 Design Standards Related to Road Drainage

Drainage of water from pavement surface is of paramount importance as far as preserving the road assets created by investing huge funds in addition to maintaining the structural soundness and functional efficiency of the road. Design standards related to road drainage are essentially based on the guidelines given in IRC: SP: 42 — 1994 "Guidelines on Road Drainage" and in IRC: SP: 50 - 1999 "Guidelines on Urban Drainage". The suggested design values / standards are detailed in **Table 3.5.**

Table 3.5: Design Standards Related to RoadDrainage

SI No.	Design Parameters	Design Values
1.	• Camber	1.7 - 2.5 % (bi - directional) for carriageway (camber of 3% is adopted).
	• Longitudinal Gradient	Minimum 0.3 - 0.5% for satisfactory drainage
	• Drain Type	Cast in situ RCC box drain with Precast RCC cover slab. RCC box culverts across cross roads.
	• For Existing Drains	Desilting and Rectification of Damaged Portion

3.5 Design Standards Related to Road Furniture and Appurtenances

Utility and importance of the road are greatly enhanced by installing road furniture and appurtenances at appropriate locations along the project road, which ensures improved road safety. Planning and design of road furniture and appurtenances are as per the guidelines stipulated in IRC. Detailing of each of these components has been done so as to integrate the same with the road improvement scheme. The suggested design values / standards are detailed in **Table 3.6.**

Table 3.6: Design Standards Related to Road Furniture and Appurtenances

SL No.	Design Parameters	Reference Code / Design Values
1.	Road Markings	IRC: 35 - 1997 "Code of Practice for Road Markings".
2.	Road Signs	IRC: 67 - 2001 "Code of Practice for Road Signs".
3.	Road Delineators	IRC: 79 - 1981 "Recommended Practice for Road Delineators".
4.	Pedestrian Facilities	IRC: 103 - 1988 "Guidelines for Pedestrian Facilities".

In addition to the above measures various other integral road components have been planned so as to achieve the maximum and optimal use of the carriageway with no / least interference to traffic flow at the same time ensuring adequate facilities to other road users especially pedestrians. All the encroachments, if any shall be cleared within the RoW.

3.7 Design Standards Related to Bridges and CD Structures

The design standards and loading considered for culverts and bridges are as stipulated in latest IRC codes / Special publications supplemented by appropriate MOST circulars and/or IS codes. The unsafe and/or deficient bridge and culvert structures (existing) will be rehabilitated or replaced by sound structures.

Chapter - 4
PROJECT COST ESTIMATES

4.1 Detailed Cost Estimate

Detailed cost Estimate has been worked out based on detailed engineering design

4.2 General

Cost Estimate is an important part of the Report as it provides vital input to financial evaluation of the project. The cost estimates have been prepared for Strengthening of the existing road including strengthening of longitudinal drains, road furniture, site clearance and Dismantling.

4.3 Basic rates

As part of Report, Rate Analysis of each of the item has been prepared by adopting PW, P & IWTD SR 2018 - 19, Bangalore Circle. The rates as given in PW, P & IWTD SR are to be enhanced by 6% for additional weightages for the works to be executed under extra ordinary conditions for Bangalore Metropolitan Limits. Items not covered in NHSR / PW, P & IWTD SR have been based on market rates.

4.4 Project Management and Quality Control

Provision of around 2.00% of Construction Cost has been made towards Cost of DPR Preparation, Quality Control, PMC and Proof Checking.

4.5 Project Cost

The total project cost for the proposed work is 200.00 Lakh.

Detailed Cost Estimate is enclosed in **Annexure A. 5.1**

Annexure A. 1.1
KEY MAP

Name of Work: Providing Walking track and other developmental works to Attur lake in Ward No.03 Attur

KEY MAP

Asst. Executive Engineer
Project Division
Yelahanka Zone
Bangalore